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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/771,074 | 02/03/2004 | Joel F. Zuhars | 137782 (MHM - 15221US01) | 1973 |

23446 7590 10/27/2010

MCANDREWS HELD & MALLOY, LTD
500 WEST MADISON STREET
SUITE 3400
CHICAGO, IL 60661

| EXAMINER | |
|---|---|
| BITAR, NANCY | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2624 | |

| MAIL DATE | DELIVERY MODE |
|---|---|
| 10/27/2010 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/771,074 | ZUHARS ET AL. | |
| | Examiner | Art Unit | |
| | NANCY BITAR | 2624 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *06 August 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-3 and 5-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 5-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/28/2010*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

## DETAILED ACTION

### *Response to Arguments*

Applicant's arguments, see pages 6-16, filed 4/20/2010, with respect to the rejection(s) of claim(s) 1-3,5-20 under 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Zylka et al ( US 2001/0027263).

### Examiner Notes

1. Examiner cites particular columns and line numbers in the references as applied to the claims below for the convenience of the applicant. Although the specified citations are representative of the teachings in the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested that, in preparing responses, the applicant fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the examiner

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, 5-20 are rejected under 35 U.S.C. 103(a) over Jensen et al (US 6,666,579) in view of Zylka et al ( US 2001/0027263).

3. As to claim 1, Jensen et al. teaches a method of performing instrument tracking on an image comprising:

collecting in a collection device that rotatably moves a plurality of static images using processing computer (a C-arm unit having an x-ray source for generating x-rays and a receptor for obtaining image exposures from received x-rays, the C-arm capable of moving the x-ray source and receptor along an image acquisition path between at least first and second exposure positions; figure 1; note that The image processing computer 16 collects a series of image exposures 32 from the receptor 34 as the C-arm 12 is rotated);

computing on a tracking data processor at least one of a position and orientation of at least one instrument for said plurality of static images (the tracker module 18 receives position information from receptor, patient and instrument position sensors 40, 42 and 44, respectively, figure 1; note that the C-arm may be manually, mechanically or automatically moved along the image acquisition path.); and

automatically displaying on an output device each image in said collected plurality of static images in sequential image by image manner to create 3D information of said position and orientation of said instrument by creating motion through the animation process, wherein said at least one position and orientation of said at least one instrument is projected on each said image (The display graphics processor 295 accesses the slice data set memory 290 to display the image slices on the display 250. The display graphics processor 295 also constructs graphical representations of the instrument or tool 24 and overlays the instrument graphic with

the image slices on the display 250. The display graphics processor 295 may present multiple two-dimensional image slices simultaneously on the display 250 with instrument graphics superimposed upon each image slice, column 10, lines 25-50). While Jensen meets a number of the limitations of the claimed invention, as pointed out more fully above, Jensen does not specifically teach collected plurality of static images in sequential image by image manner to create3D information of said position and orientation of said instrument by creating motion through the animation process, wherein said at least one position and orientation of said at least one instrument is projected on each said image . Specifically, Zylka teaches position measuring device 13 with two infrared CCD cameras 14 which are arranged on a stand to the side of the examination zone. The spatial positions of correspondingly constructed infrared light-emitting diodes can be determined by means of said cameras. In order to determine the position of a medical instrument 16 used during the intervention, in this case being a biopsy needle, the end of the biopsy needle 16 which projects from the patient is provided with three of such infrared light-emitting diodes 17 in defined positions. In order to determine the position of the X-ray device 2, or the imaging geometry of the X-ray device 2, during the acquisition of X-ray images during the operation, three of such light-emitting diodes 18 and 19, respectively, are provided on the X-ray source 6 and the X-ray detector 7, respectively. The spatial position of an acquired X-ray image can be determined from the imaging geometry thus determined, that is, the position of the X-ray image relative to the patient 3.Note that the displaying device (paragraph [0019]) displays as a sequence of images (i.e. motion animation) along with a position and orientation of said instrument, wherein said at least one position and orientation of said at least one instrument is projected on each said image ( Paragraph[0018-0020] )

It would have been obvious to one of ordinary skill in the art to project the instrument on each image and create 3D information of orientation and position of the instrument through animation process of the sequential image in Jensen et al in order to enables the formation of images containing image information acquired pre-operatively as well as intra-operatively, and also the reproduction of the instantaneous position of the medical instrument in said images. Therefore, the claimed invention would have been obvious to one of ordinary skill in the art at the time of the invention by applicant.

As to claim 2, Jensen et al. teaches the method of claim 1 wherein said plurality of images comprise a plurality of 2D fluoroscopic images (the acquisition module acquires a sequence of 2D fluoroscopic images at a predetermined positions spaced along the imaging path. Optionally the acquisition module may obtain 2D fluoroscopic images at an even interval along the image acquisition path, column 3, lines 44-55).

As to claim 3, Zylka et al. teaches the method of claim 2 comprising continuously presenting the image by image animation using a display (paragraph [0019-0020])

As to claim 5, Jensen et al. teaches the method of claim 1 comprising calibrating at least one image of said collected plurality of images such that said at least one position and orientation of said at least one image may be accurately displayed (a display graphics processor 295 in the image processing computer 16 construct graphical representation of the instrument or tool 24, the display graphic processor 295 may also present multiple two dimensional image sliced simultaneously on the display 250 with instrument graphics superimposed upon each slice , column 9, lines 66-column 10, lines 1-65)).

As to claim 6, Jensen et al. teaches the method of claim 5 comprising selecting at least one calibrated image to be a current image (The display graphics processor 295 may present multiple two-dimensional image slices simultaneously on the display 250 with instrument graphics superimposed upon each image slice. Alternatively or in combination with image slices, the display graphics processor 295 may construct a three-dimensional rendering of the 3-D patient data volume and display the three-dimensional rendering on the display 250 separately or in combination with a three-dimensional graphical representation of the instrument 24, column 10, lines 25-49).

As to claim 7, Jensen et al. teaches the method of claim 6 comprising computing said at least one position and orientation for said at least one instrument for said current image (FIG. 1, the tracker module 18 receives position information from receptor, patient and instrument position sensors 40, 42 and 44, respectively, column 8, lines 33-66)

As to claim 8, Jensen et al. teaches the method of claim 1 comprising collecting said plurality of images using at least one moveable collection device (the C-arm 12 is movable in several directions along multiple images acquisition paths , column 3, lines 19-60).

As to claim 9, Jensen et al. teaches the method of claim 8 wherein said moveable collection device comprises a C-arm coupled to an imaging device (a C-arm 12 and an image processing computer 16 , figure 1)

The limitation of claim 10 has been addressed above except for the following "automatically repeating said selecting, computing and projecting and displaying steps to create an animation using a sequential image by image presentation through said series of 2D images". Zylka teaches this limitation in paragraph [0019-0025])

As to claim 11, Jensen et al. teaches the method of claim 10 comprising collecting said series of 2D images using a collection device that moves ( the C-arm is moved through an image acquisition path (A, B), along which at least first and second images are obtained. An acquisition module obtains multiple 2-D fluoroscopic images at desired positions along the image acquisition path and an image processor constructs a 3-D volume of object data based on the 2-D fluoroscopic images, see abstract)

As to claim 12, Jensen et al. teaches the method of claim 11, wherein said collection device comprises a C-arm coupled to the imaging device (image processing computer 16 connected to the receptor device 34, figure 1).

As to claim 13, Jensen et al. teaches the method of claim 10 wherein said series of 2D images comprise a series of 2D fluoroscopic images (2D fluoroscopic images , column 3 , lines 1-17).

As to claim 14, Jensen et al. teaches the method of claim 10 comprising continually using said sequential image presentation by image through said series of 2D images in a display (A fluoroscopy imaging system 200 includes a detector 210 mounted to a C-arm for detecting x-rays passed through a patient. A tracking subsystem 220 receives patient coordinate information 225, detector coordinate information 230 and instrument coordinate information 235. The tracking subsystem 220 processes the coordinate information 225-235 and passes it to an image processing unit 240 which receives exposure frames from the detector 210 and outputs image frames to the display 250, figure 7).

As to claim 15, Jensen et al. teaches the method of claim 14 comprising projecting said at least one position and orientation of said at least one instrument into at least one image of said

series of 2D images (he image processor may perform an iterative reconstruction technique to construct the 3-D volume. Alternatively, the image processor may perform a back projection technique to construct the 3-D volume, column 3, lines 19-26)

As to claims 16-17, Jensen et al. teaches the method of incrementing at least said current image and recomputing said at least one position and orientation of said at least one instrument (the 3-D patient data set is updated with the information from 10 or more exposures before patient slices are reconstructed. Additional exposures may be obtained, beyond 10 exposures by repeating steps 305-325, thereby improving the information within the 3-D patient data set. Once patient slices and/or 3-D images are constructed at step 335, the patient slices and/or 3-D images are displayed at step 340, alone or in combination with instrument graphics representing the position of the instrument 24 relative to the patient 22, column 11 ,lines 15-29) .

The limitation of claims 18-20 has been addressed above.

**Conclusion**

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NANCY BITAR whose telephone number is (571)270-1041. The examiner can normally be reached on Mon-Fri (7:30a.m. to 5:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on 571-272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nancy Bitar/
Examiner, Art Unit 2624

/Wes Tucker/
Primary Examiner, Art Unit 2624